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PROCESS OF ACID GROOVING SAFETY GLASS

Brook J. Dennison, Tarentum, Pa., assignor to
Duplate Corporation, a corporation of Dela-
ware

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6 Claims. (Cl. 49—81)

The invention relates to a process of providing the edge groove in safety or laminated glass, which glass ordinarily consists of a sheet of either cellulose acetate or cellulose nitrate having a sheet of glass cemented to each side. In order to edge seal this product, it is necessary to groove out the cellulose plastic sheet to the depth of about one-sixteenth of an inch in order to apply the sealing material, such as pitch. One method now largely used, consists in placing the laminated sheets in a bath of hot concentrated sulphuric acid which eats out the plastic sheet at its edges to the desired depth to provide the groove, such method being disclosed in the patent to James H. Sherts No. 1,785,099, dated December 16, 1930. The objects of the present invention are to provide an improved process, (1) which operates to give faster grooving; (2) which permits the acid bath to be used for a longer period before the replacement required by the fouling of the bath; and (3) which gives a clean groove free from the black deposit which forms when the sulphuric acid bath, as heretofore used, is employed with safety glass having a cellulose acetate reinforcing sheet.

Briefly stated, the improvement consists in mixing with the sulphuric acid bath, a limited amount of oxidizing agent, such as nitric acid. This agent reacts with the carbon which forms in the groove, and in the bath, incident to the decomposition of the plastic, forming a gas and leaving the groove and the bath free from carbon. This is particularly important in grooving out cellulose acetate, as the carbon deposit left in the groove, due to the action of the sulphuric acid, must otherwise be scraped out, involving a considerable addition to the cost of grooving. If the carbon deposit is not scraped out before sealing the groove, it will give moisture a path through the seal and defeat the purpose of the seal. The oxidizing agent is not so important when grooving out cellulose nitrate, as in this operation the deposit of carbon in the groove is much less pronounced, but the fine particles of carbon are distributed through the bath and adversely affect the operation, in that they interfere with heat distribution through the bath, slow up the action of the sulphuric acid on the plastic, and leave a dirty film on the glass and in the groove which is difficult to remove by washing. For this reason, the acid forming the bath must be more frequently replaced (when the plastic is either nitrate or acetate) than is the case when an oxidizing agent is used.

In carrying out the process, the bath will or-

dinarily consist of from 85 to 98 per cent of sulphuric acid and 1 per cent or less of nitric acid, preferably from one half per cent up, for this gives all the desired results, and does not give off an objectionable amount of fumes of the oxides of nitrogen. The temperature of the bath preferably ranges from 150 to 200 degrees F. The plates to be grooved are placed in the bath and left for a period of from five to ten minutes, after which they are removed and washed with water.

The process, as heretofore indicated, gives a clean uniform groove. The sulphuric acid decomposes the plastic forming a number of chemical compounds that are given off as gases, or deposited in the groove as carbon, if the oxidizing agent is not present. The nitric acid oxidizes the carbon as it forms and leaves the surface of the plastic in condition to permit further action by the sulphuric acid.

The oxidizing agent also prevents the formation and accumulation of carbon sludge in the bath, so that the plates, when removed from the bath, are easily washed, and the bath may be used for much longer periods without renewal.

Nitric acid is preferred as the oxidizing agent, although others may be used, since the cost is low, and no insoluble material is formed to pollute the bath, as is the case with certain other agents (such as potassium dichromate) which form precipitates that collect in the bottom of the tank. Among the oxidizing agents which I have found may be employed, are the potassium dichromate, above referred to, potassium permanganate, and manganese dioxide. If a strong oxidizing agent, such as potassium permanganate, is used, the reaction is very violent, and the temperature must therefore be kept at a lower point in order to control the depth and uniformity of the groove.

What I claim is:

1. The process of removing the periphery of a reinforcing sheet of cellulose plastic lying between a pair of glass sheets in a laminated plate, which consists in submerging the plate in a bath of sulphuric acid containing an oxidizing agent.

2. The process of removing the periphery of a reinforcing sheet of cellulose acetate lying between a pair of glass sheets in a laminated plate, which consists in submerging the plate in a bath of sulphuric acid containing an oxidizing agent.

3. The process of removing the periphery of a reinforcing sheet of cellulose nitrate lying between a pair of glass sheets in a laminated plate, which consists in submerging the plate in a bath of sulphuric acid containing an oxidizing agent.

4. The process of removing the periphery of a reinforcing sheet of cellulose plastic lying between a pair of glass sheets in a composite plate which consists in submerging the plate in a bath of sulphuric acid containing nitric acid as an oxidizing agent.	of sulphuric acid containing nitric acid as an oxidizing agent.	80
5. The process of removing the periphery of a reinforcing sheet of cellulose nitrate lying between a pair of glass sheets in a composite plate which consists in submerging the plate in a bath	6. The process of removing the periphery of a reinforcing sheet of cellulose acetate lying between a pair of glass sheets in a composite plate which consists in submerging the plate in a bath of sulphuric acid containing nitric acid as an oxidizing agent.	85
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